

CLAIMS

1. A haemostatic composition comprising a biologically absorbable material and hyaluronic acid (HA) or a derivative thereof.

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2. The haemostatic composition according to claim 1, wherein said composition comprises at least 0.5% (w/w) of HA or a derivative thereof calculated on the basis of the total weight of the water-free composition, or at least 1% (w/w) of HA or a derivative thereof, or at least 2% (w/w) of HA or a derivative thereof, or at least 3% (w/w) of HA or a derivative thereof, or at least 5% (w/w) of HA or a derivative thereof, or at least 7% (w/w) of HA or a derivative thereof, or at least 8% (w/w) of HA or a derivative thereof, or at least 10% (w/w) of HA or a derivative thereof, at least 15% (w/w) of HA or a derivative thereof, such as at least 20% (w/w) of HA or a derivative thereof, e.g. at least 25% (w/w) of HA or a derivative thereof, preferably at least 30% (w/w) of HA or a derivative thereof, such as at least 35% (w/w) of HA or a derivative thereof, e.g. at least 40% (w/w) of HA or a derivative thereof.

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3. The haemostatic composition according to claim 2, wherein said HA derivative is a salt or an ester of HA.

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4. The haemostatic composition according to any of the preceding claims, wherein said biologically absorbable material is selected from the group consisting of gelatine, collagen, chitin, chitosan, alginate, cellulose, e.g. oxidised cellulose, oxidised regenerated cellulose, carboxymethylcellulose (CMC) or hydroxyethylcellulose (HEC), polyglycolic acid, polyacetic acid, derivatives thereof and mixtures thereof.

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5. The haemostatic composition according to any of the preceding claims, wherein said composition comprises at the most 99% (w/w) of said biologically absorbable material, such as at the most 95% (w/w) of said biologically absorbable material, or at the most 90% (w/w) of said biologically absorbable material, or at the most 85% (w/w) of said biologically absorbable material, such as at the most 80% (w/w) of said biologically absorbable material, e.g. at the most 75% (w/w) of said biologically absorbable material, preferably at the most 70% (w/w) of said biologically absorbable material, such as at the most 65% (w/w) of said biologically absorbable material, e.g. at the most 60% (w/w) of said biologically absorbable material.

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6. The haemostatic composition according to any of the preceding claims, which further comprises at least one blood coagulation factor, wherein said blood coagulation factor is selected from the group consisting of thrombin or a precursor thereof, factor Va, factor

VIIa, factor VIIa, factor IXa, factor Xa, factor XIa, factor XIIa, factor XIIIa and calcium ions.

7. The haemostatic composition according to claim 6, which further comprises a thrombin-
5 stabilising agent selected from the group consisting of naturally occurring amino acids, mono-, di- or polysaccharides, polyglycols, proteins and mixtures thereof.

8. The haemostatic composition according to any of the preceding claims, which further
10 comprises at least one anti-fibrinolytic agent, wherein said anti-fibrinolytic agent is selected from the group consisting of aprotinin, pepstatin, leupeptin, antipain, chymostatin, gabexate mesilate, fibronectin, ϵ -amino caproic acid and tranexamic acid.

9. A haemostatic composition according to any of claims 1-8, wherein said composition is
15 in the form of a sponge.

10. The haemostatic sponge according to claim 9, wherein said sponge absorbs less water
than an absorbable gelatine sponge, such as Surgifoam®.

11. The haemostatic sponge according to claim 10, wherein the ratio between the water
20 absorbed by a haemostatic sponge according to any of claims 1-11 and the water absorbed by an absorbable gelatine sponge, such as Surgifoam®, is at the most 0.95 when determined in accordance with USP 24.

12. The haemostatic sponge according to any of claims 9-11, wherein said HA, or a
25 derivative thereof, is incorporated in said sponge.

13. The haemostatic sponge according to any of claims 9-11, wherein said HA, or a
derivative thereof, is applied to one or more of the surfaces of the sponge.

30 14. The haemostatic sponge according to any of claims 9-13, wherein at least one of the surfaces of said haemostatic sponge is covered by a top sheet.

15. The haemostatic sponge according to claim 14, wherein said top sheet is removable.

35 16. A haemostatic composition according to any of claims 1-8, wherein said composition is in the form of a powder or flakes.

17. A haemostatic composition according to any of the preceding claims, wherein said
composition is dry.

18. A haemostatic composition according to any of claims 1-8, wherein said composition is
5 a paste comprising water.
19. Use of a haemostatic composition or sponge according to any of the preceding claims
as a haemostatic adjunct in medical, veterinary or dental surgery.
- 10 20. Use of a haemostatic composition or sponge according to any of claims 1-18 for the
preparation of a haemostatic adjunct to be used in medical, veterinary or dental surgery.
21. Use of a composition or sponge according to any of claims 1-18 as a vehicle for
delivery of an agent.
- 15 22. A method for arresting bleeding comprising applying to the site of bleeding a
haemostatic composition or sponge according to any of claims 1-18.
23. A method of producing a haemostatic composition comprising the steps of:
- 20 i) mixing a biologically absorbable material and hyaluronic acid or a derivative
thereof and a solvent
- ii) treating the mixture obtained in step i) with dry heat at a temperature between
110-200°C.
- 25 24. A method according to claim 23, wherein said method comprises a further step of
drying the mixture obtained in step i) before treating it according to step ii).
25. A method for preparing a haemostatic sponge according to claim 9, said method
comprising the steps of:
- 30 i) treating a sponge of a biologically absorbable material with dry heat at a
temperature between 110-200°C
- ii) soaking the sponge obtained in step i) in hyaluronic acid or a derivative thereof
26. A method according to claim 25, wherein said method further comprises the step of
35 drying the sponge obtained in step ii).
27. A method for preparing a haemostatic sponge according to claim 12, said method
comprising the steps of:

- i) mixing a biologically absorbable material, hyaluronic acid or a derivative thereof and solvent; and
- ii) drying said mixture.

5 28. A method according to claim 27, wherein said method further comprises a step of stabilising the mixture obtained in step ii).

29. A method according to any of claims 23-28, wherein the mixing of the biologically absorbable material, hyaluronic acid or a derivative thereof and a solvent may be
10 performed by any of the following alternatives:

- a) mixing a biologically absorbable material with hyaluronic acid or a derivative thereof and then subsequently adding a solvent
- b) mixing a solution of a biologically absorbable material with a solution of hyaluronic acid or a derivative thereof
- 15 c) mixing a biologically absorbable material with a solution of hyaluronic acid or a derivative thereof
- d) mixing a solution of a biologically absorbable material with hyaluronic acid or a derivative thereof.

20 30. The method according to any of claims 23-29, wherein said mixing is performed under mechanical influence, such as whipping, stirring, spinning, static mixing, motionless mixing or centrifugation.

31. A method for preparing a haemostatic sponge according to claim 13, said method
25 comprising the steps of:

- i) providing a sponge comprising a biologically absorbable material;
- ii) providing a solution of HA or a derivative thereof;
- 30 iii) applying said solution of HA, or a derivative thereof, to one or more of the surfaces of the sponge; and
- iv) drying the resulting sponge.

35 32. A method according to claim 31, wherein said method further comprises the step of stabilising the sponge after one or more of the following steps: i), iii) and/or iv).

33. A method according to any of claims 28 and 32, wherein said stabilising comprises treating the mixture or sponge with dry heat at a temperature between 110-200°C or treating it with a compound capable of chemically crosslinking the mixture or sponge.

5 34. A method according to any of claims 23-33, wherein said method further comprises a step of sterilization of the mixture or sponge.

35. A method according to any of claims 23-34, wherein the biologically material is selected from the group consisting of gelatine, collagen, chitin, chitosan, alginate,
10 cellulose, oxidised cellulose, oxidised regenerated cellulose, carboxymethylcellulose (CMC), hydroxyethylcellulose (HEC), polyglycolic acid, polyacetic acid, derivatives thereof and mixtures thereof.

36. The method according to any of claims 23-35, wherein said solution of HA, or a
15 derivative thereof, is provided in the form of a gel.

37. The method according to any of claims 24 or 26-36, wherein said drying is performed at a temperature from about 20°C to about 40°C, such as at about 30°C.

20 38. The method according to any of claims 24 or 26-37, wherein said drying is conducted for about 6 to about 24 hours, such as about 16 hours.

39. The method according to any of claims 24 or 26-36, wherein said drying is performed by freeze-drying.

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40. A haemostatic composition obtainable by a method according to any of claims 23-24, 29-30 and 34-39.

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